8.17 KENT COUNTY

This chapter presents information about stream conditions of potential management interest in Kent County based on the 2000-2004 Maryland Biological Stream Survey (MBSS) results. Information from MBSS data collected between 1994 and 1997 can be found in MDNR 2001o.

8.17.1 Ecological Health

Based on the three ecological health indicators used by the MBSS, the overall condition of Kent County streams in 2000-2004 was Fair (Figure 8-132). The FIBI results indicate that 41% of the streams in the county were in Good condition, while only 10% rated Good using the BIBI. In contrast, 42% of the streams in the county scored as Poor or Very Poor using the CBI, while 10% scored as Good and 50% scored as Fair.

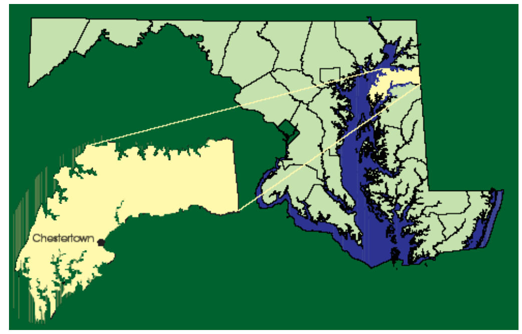
There was no strong geographic pattern in the distribution of high and low IBI scores within the county. The highest rated stream in Kent County using the Combined Biotic Index (CBI) was an unnamed tributary to Andover Branch, while the lowest rated streams included an unnamed tributary to East Fork Langford Branch, Grays Inn Creek and Swan Creek (Table 8-33). Based on Stream Waders volunteer data, a large number of sites in the county rate as Poor or Very Poor for benthic macroinvertebrates (Table 8-34).

One MBSS Sentinel site was located in Kent County, Swan Creek. Sentinel sites were chosen to provide a representation of the best remaining streams around the state and track natural variations in stream health. Where possible, Sentinel sites are located in watersheds with as much protected land as possible, or in areas projected to become degraded from development at a slower pace. More information about the MBSS Sentinel stream network is found in: 2000-2004 Maryland Biological Stream Survey Volume 11: Sentinel Sites (http:www/dnr/Maryland.gov/streams/pubs/ea05-8_sentinel.pdf).

8.17.2 Physical Habitat

8.17.2.1 Overall Condition

Based on the Physical Habitat Index (PHI), 9% of the streams in Kent County had Minimally Degraded habitat, 54% had Partially Degraded habitat, and 41% had Degraded or Severely Degraded habitat (Figure 8-133). Sites with Minimally Degraded physical habitat were all located in the eastern part of the county, while sites with Severely Degraded habitat were scattered around the county.



8.17.2.2 Trash

Over 68% of the stream miles in Kent County were rated Optimal for trash (Figure 8-134). In contrast, no streams were rated as being in Marginal or Poor condition. Most sites in the eastern part of the county had minimal levels of trash, while trash levels were more often higher in the eastern portion of the county.

8.17.2.3 Channelization

About 11% of the stream miles in Kent County were channelized (Table 8-4). Earthen ditches and concrete channels were the most common types of channelization (Figure 8-135). Channelized sites were located in the eastern part of the state.

8.17.2.4 Inadequate Riparian Buffer

About 1% of the stream miles in Kent County had no riparian buffers during the 2000-2004 MBSS (Table 8-3). In addition, 7% of stream miles had severe breaks in existing riparian buffers. No geographic trend was evident for either buffer breaks or areas devoid of riparian buffer (Figure 8-136). Additional information about buffer breaks, analyzed by county, is provided in: 2000-2004 Maryland Biological Stream Survey Volume 10: Riparian Zone Conditions (http:www/dnr/Maryland.gov/streams/pubs/ea05-7_riparian.pdf).

8.17.2.5 Eroded Banks/Bedload Movement

Nearly 38% of the stream miles in Kent County were rated as having minimal (Optimal) bank erosion (Figure 8-137). In contrast, 26% were rated Poor and an additional 14% of stream miles were rated as Marginal. No geographic trend in the distribution of bank erosion problems was evident.

Most of the stream miles in Kent County were rated as having minor bar formation (Figure 8-137). Of the remaining 42%, 27% were rated as having moderate bar formation and 15% were characterized as having extensive bar formation. No geographic trend in the distribution of bar formation problems was evident.

8.17.3 Key Nutrients

8.17.3.1 Nitrate-Nitrogen

Over 74% of the stream miles in Kent County had nitrate-nitrogen levels elevated above the range for forested streams in Maryland (Figure 8-138). Of these stream miles, a total of 18% had nitrate-nitrogen in excess of 5 mg/l, the threshold for biological impacts. Sites with low nitrate-nitrogen levels were clustered in the eastern portion of the county and on tributaries close to tidal waters.

8.17.3.2 Total Phosphorus

Nearly 93% of the stream miles in Kent County had total phosphorus levels that were above the range observed for forested streams in Maryland (Figure 8-139). Of these stream miles, about 60% had levels in excess of the threshold where faunal losses may occur. Phosphorus levels were slightly lower in the center of the county, but generally high elsewhere.

8.17.4 Stream and River Biodiversity

To provide a means to prioritize stream systems for biodiversity protection and restoration within each county and on a statewide basis, a tiered watershed and stream reach prioritization method was developed. Special emphasis was placed on state-listed species, stronghold watersheds for state-listed species, and stream reaches with one or more state-listed aquatic fauna. Fauna considered included stream salamanders, freshwater fishes, and freshwater mussels. Rare, pollution-sensitive benthic macroinvertebrates collected during the 1994-2004 MBSS were also used to identify the suite of watersheds necessary to conserve the full array of known stream and river biota in Maryland. A complete description of the bio-diversity ranking process is found in: 2000-2004 Maryland Biological Stream Survey Volume 9: Stream and Riverine Biodiversity (http:www/dnr/Maryland.gov/streams/pubs/ea05-6_biodiv.pdf).

Of the four watersheds found in Kent County, the Upper Chester River was classified as Tier 1, meaning that this watershed serves as a stronghold for one or more state listed aquatic species (Figure 8-140). It is noteworthy that this watershed ranked 6th of 84 in Maryland for stream and river biodiversity. In contrast, the Middle Chester River watershed was the lowest ranking for stream and river biodiversity in the county, and ranked 57th of 84 in Maryland. Any reaches that had either state-listed or GCN species, or high intactness values were highlighted to facilitate additional emphasis in planning restoration and protection activities.

AN IMPORTANT NOTE ON BIODIVERSITY MANAGEMENT

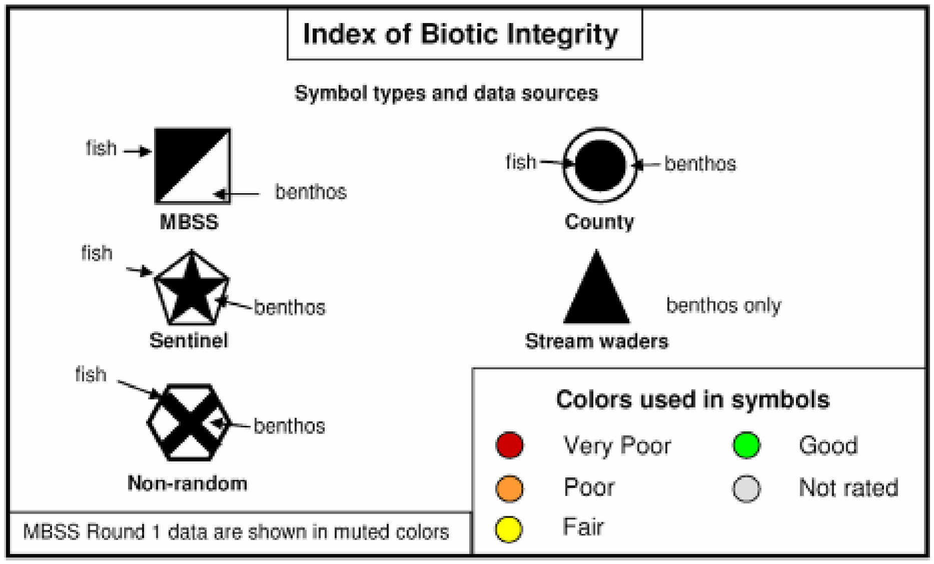
Perhaps the largest ongoing natural resources restoration and protection effort in Maryland is associated with the Chesapeake Bay. In most cases, freshwater biodiversity is not specifically considered during placement and prioritization of Bay restoration and protection projects. In this report and in the more detailed volume in the series on aquatic biodiversity, a system of biodiversity ranking is presented to provide counties and other stewards with a means to plan appropriate protection and restoration activities in locations where they would most benefit stream and river species. Given the historically low level of funding for biodiversity protection and restoration in Maryland and elsewhere, the potential benefit of incorporating freshwater biodiversity needs into other efforts is quite large.

However, it is important to note that although freshwater taxa are the most imperiled group of organisms in Maryland, other groups and individual species not typically found in freshwater habitats are also at high risk and constitute high priority targets for conservation. In addition, freshwater taxa that prefer habitats such as small wetlands may not be well-characterized by the ranking system employed here. To conserve the full array of Maryland's flora and fauna, it is clearly necessary to use other, landscape-based tools and consider factors such as maintaining or reconnecting terrestrial travel corridors.

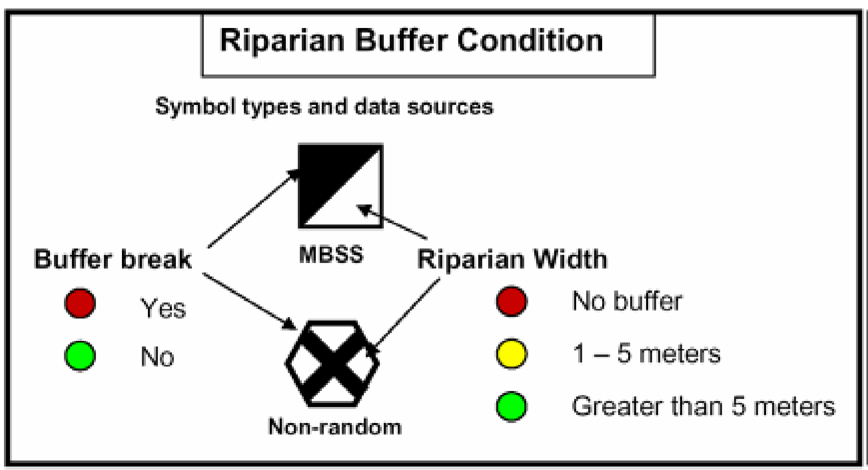
8.17.5 Stressors

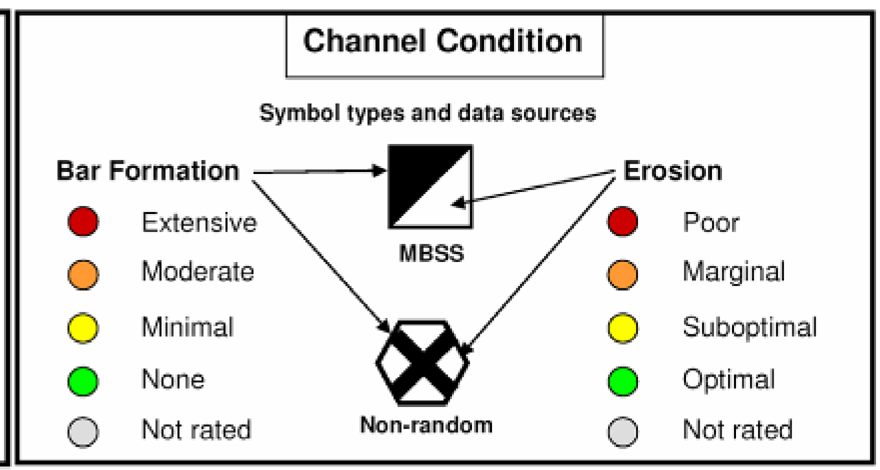
At 97% of stream miles, the most extensive stressor characterized by the MBSS in Kent County during the 2000-2004 MBSS was non-native terrestrial plants in the riparian zone (Figure 8-5). Other stressors found were: streams with non-native aquatic fauna (present in 78% of stream miles); eroded banks (48% of stream miles); high nitrate-nitrogen (18% of stream miles); acid deposition (observed in 13% of stream miles); low dissolved oxygen (8%); channelized streams (5% of stream miles); and streams with no riparian buffer (1%).

Key to MBSS 2000-2004 County Maps



Tier 1:	Stronghold watershed (most robust remaining population) for one or more state-listed fish, aquatic herpetofauna, or freshwater mussels.
Tier 2:	Stronghold watershed for one or more non-state listed species of greatest conservation need (GCN) fish, aquatic herpetofauna, or freshwater mussels, that also had state-listed fish, aquatic herpetofauna, or freshwater mussels present.
Tier 3:	Stronghold watershed for one or more non-state listed GCN fish, aquatic herpetofauna, or freshwater mussels, no state-listed fish, aquatic herpetofauna, or freshwater mussels present.
Tier 4:	Non-stronghold watershed with one or more state-listed fish, aquatic herpetofauna, or freshwater mussels present.
Tier 5:	Not of the above, but a biodiversity conservation watershed. In other words, part of the network of watersheds that must be conserved to keep all native fishes, aquatic herpetofauna, freshwater mussels, and rare, pollution sensitive benthic macroinvertebrates extant in Maryland.
Tier 6:	Not of the above.





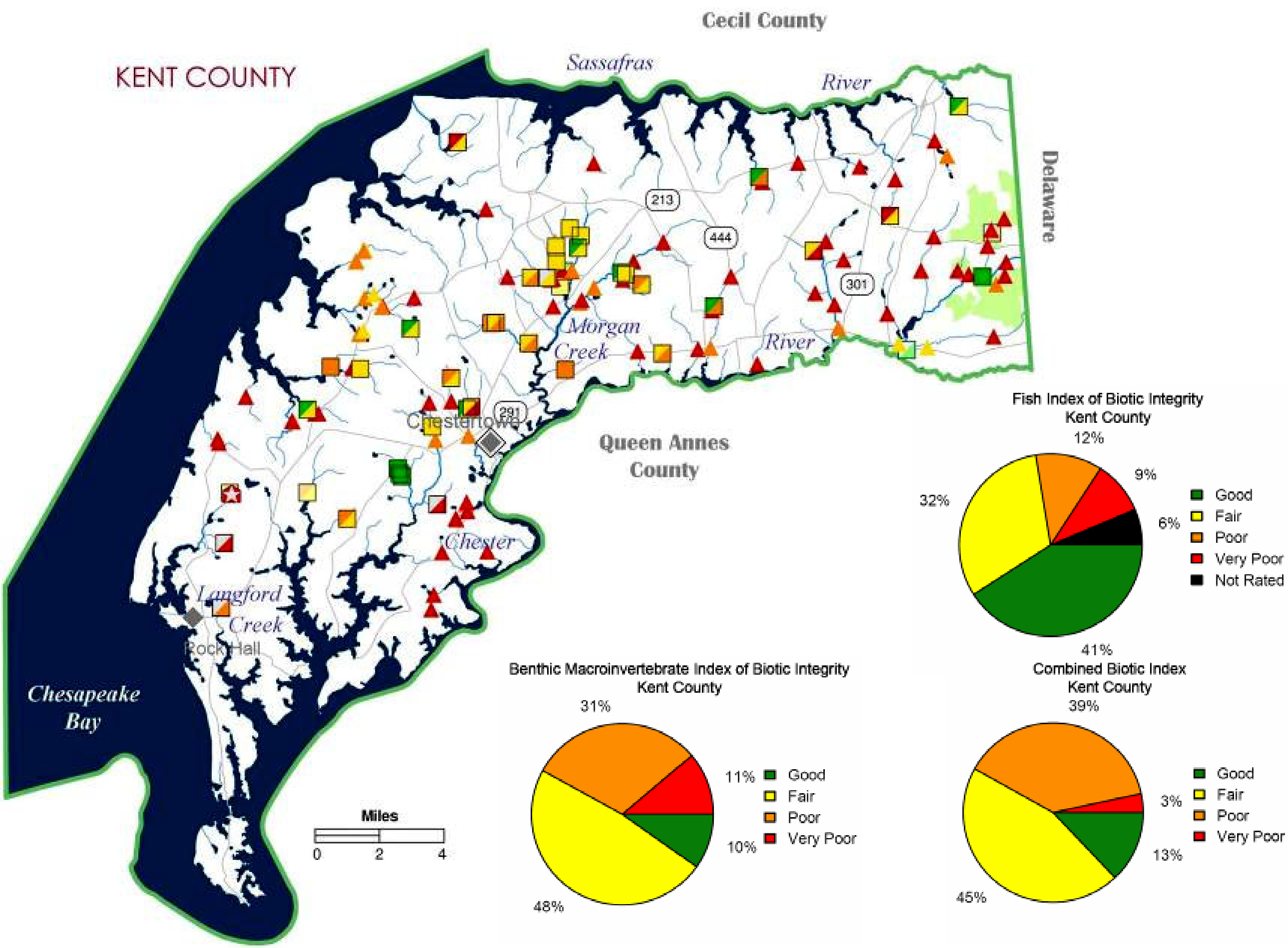


Figure 8-132. Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biotic Integrity (FIBI) pie charts and map of stream health for Kent County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie charts represent 2000-2004 data only, Combined Biotic Index pie chart represents mean of FIBI and BIBI)

Table 8-33. MBSS sites sampled in Kent County during 1994- 2004, ranked by Combined Biotic Index Score (CBI)

Kent County - MBSS Sites

SITE NUMBER	STREAM NAME	WATERSHED	CBI	SITE NUMBER	STREAM NAME	WATERSHED	CBI
	Best (in order of CBI score)				***Worst (most degraded sites first)***		
KE-N-116-123-95	Andover Branch UT	Chester River Upper	4.43	LANG-108-R-2002	East Fork Langford Creek UT1	Langford Creek	1.57
LANG-101-R-2002	East Fork Langford Creek UT2	Langford Creek	4.40	KE-N-054-114-95	Grays Inn Creek	Chester River Lower	1.57
LANG-109-R-2002	East Fork Langford Creek UT3	Langford Creek	4.40	LOCR-102-R-2002	Swan Creek UT	Chester River Lower	1.86
LANG-204-R-2002	East Fork Langford Creek	Langford Creek	4.26	LOCR-102-S-2000	Swan Creek	Chester River Lower	1.86
MICR-208-R-2002	Morgan Creek UT1	Chester River Middle	4.26	LOCR-102-S-2004	Swan Creek	Chester River Lower	1.86
UPCR-208-R-2004	Cypress Branch	Chester River Upper	4.07	KE-N-045-108-95	Cypress Branch UT	Chester River Upper	2.14
MICR-215-R-2002	Morgan Creek	Chester River Middle	3.98	SASS-102-R-2001	Swantown Creek	Sassafras River	2.33
SASS-205-R-2001	Herring Branch	Sassafras River	3.95	STIL-103-R-2001	Big Marsh UT1	Stillpond-Fairlee	2.33
STIL-119-R-2001	Mill Creek UT1	Stillpond-Fairlee	3.95	MICR-106-R-2002	Morgan Creek UT5	Chester River Middle	2.36
MICR-207-R-2002	Morgan Creek UT1 UT2	Chester River Middle	3.86	LOCR-110-R-2002	Grays Inn Creek UT	Chester River Lower	2.43
STIL-109-R-2001	Fairlee Creek UT2	Stillpond-Fairlee	3.67	UPCR-101-R-2004	Mills Branch	Chester River Upper	2.43
MICR-112-R-2003	Radcliffe Creek UT1	Chester River Middle	3.64	MICR-106-R-2003	Morgan Creek UT5	Chester River Middle	2.50
MICR-113-R-2002	Morgan Creek UT4	Chester River Middle	3.62	STIL-114-R-2001	Fairlee Creek UT1 UT1	Stillpond-Fairlee	2.52
KE-N-018-216-95	Morgan Creek UT	Chester River Middle	3.62	MICR-111-R-2003	Urieville Lake UT2 UT1	Chester River Middle	2.57
SASS-104-R-2001	Woodland Creek UT1	Sassafras River	3.52	UPCR-104-R-2004	Chester River UT1	Chester River Upper	2.57
MICR-113-R-2003	Urieville Lake UT1 UT1	Chester River Middle	3.45	MICR-205-R-2002	Morgan Creek UT2	Chester River Middle	2.69
MICR-216-R-2002	Morgan Creek UT2	Chester River Middle	3.43	LOCR-102-S-2001	Swan Creek	Chester River Lower	2.71
MICR-118-R-2002	Morgan Creek UT1 UT3	Chester River Middle	3.43	MICR-110-R-2003	Radcliffe Creek UT2	Chester River Middle	2.76
STIL-207-R-2001	Fairlee Creek UT1 UT2	Stillpond-Fairlee	3.43	MICR-102-R-2003	Radcliffe Creek	Chester River Middle	2.81
LANG-218-R-2002	East Fork Langford Creek	Langford Creek	3.29	KE-N-067-213-95	West Fork Langford Creek	Langford Creek	2.83
LOCR-102-S-2002	Swan Creek	Chester River Lower	3.29	LANG-115-R-2002	West Fork Langford Creek UT1	Langford Creek	2.83
KE-N-128-122-95	Morgan Creek UT	Chester River Middle	3.24	KE-N-096-102-95	Swan Creek	Chester River Lower	2.86
UPCR-102-R-2004	Chester River UT2	Chester River Upper	3.24				
MICR-202-R-2002	Morgan Creek UT2	Chester River Middle	3.19				
MICR-204-R-2003	Morgan Creek UT2	Chester River Middle	3.19				

Table 8-34. Stream Waders sites sampled in Kent County during 2000-2004, ranked by Family-level Benthic Index of Biotic Integrity

Kent County - Stream Wader Sites				
WATERSHED	# GOOD	# FAIR	# POOR	# VERY POOR
Langford Creek	0	0	1	1
Chester River Lower	0	0	0	4
Chester River Middle	0	0	7	16
Sassafras River	0	0	1	6
Stillpond-Fairlee	0	5	7	11
Chester River Upper	0	2	3	22

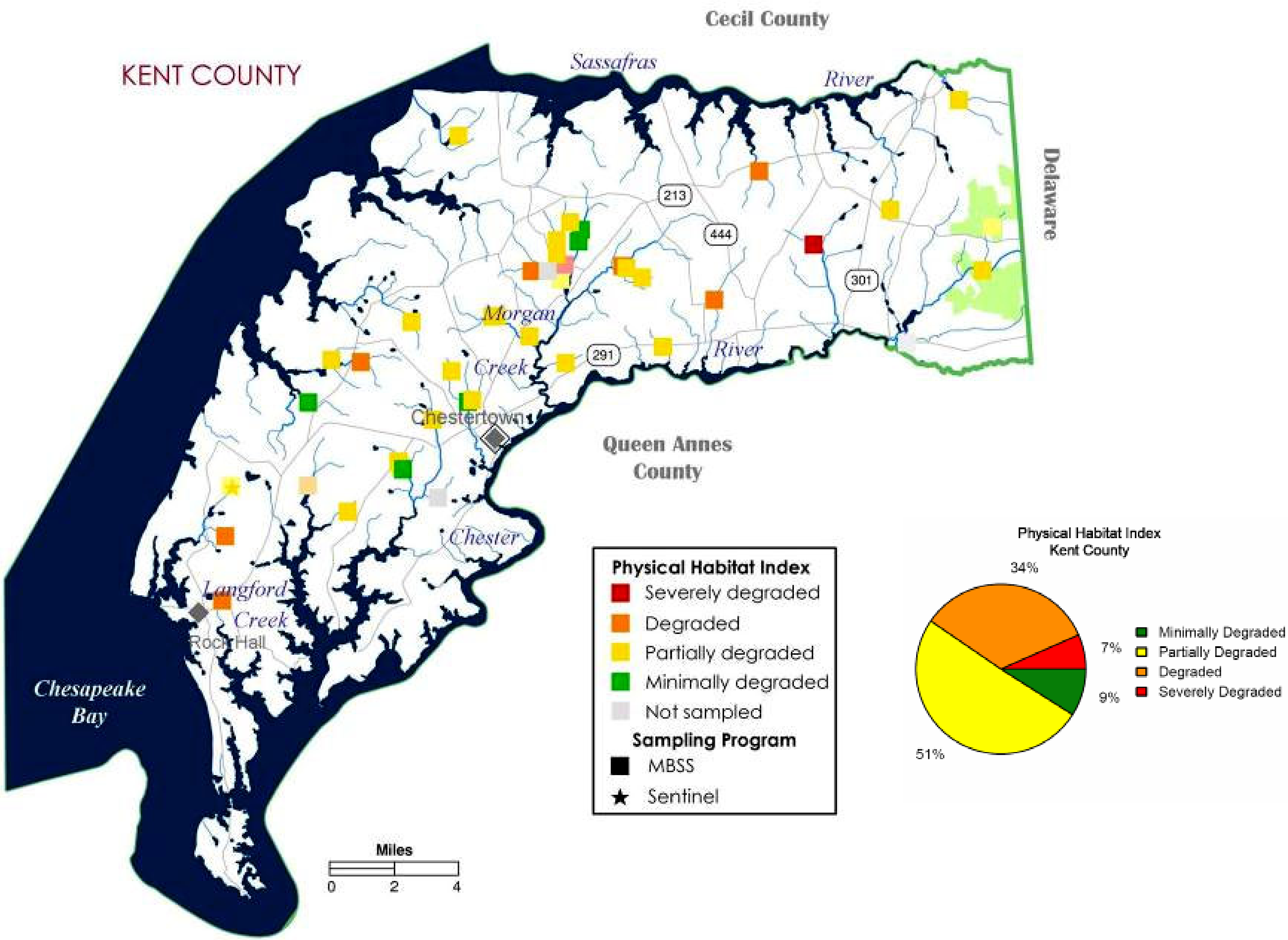


Figure 8-133. Physical Habitat Index (PHI) pie chart and map of stream habitat quality for Kent County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only)

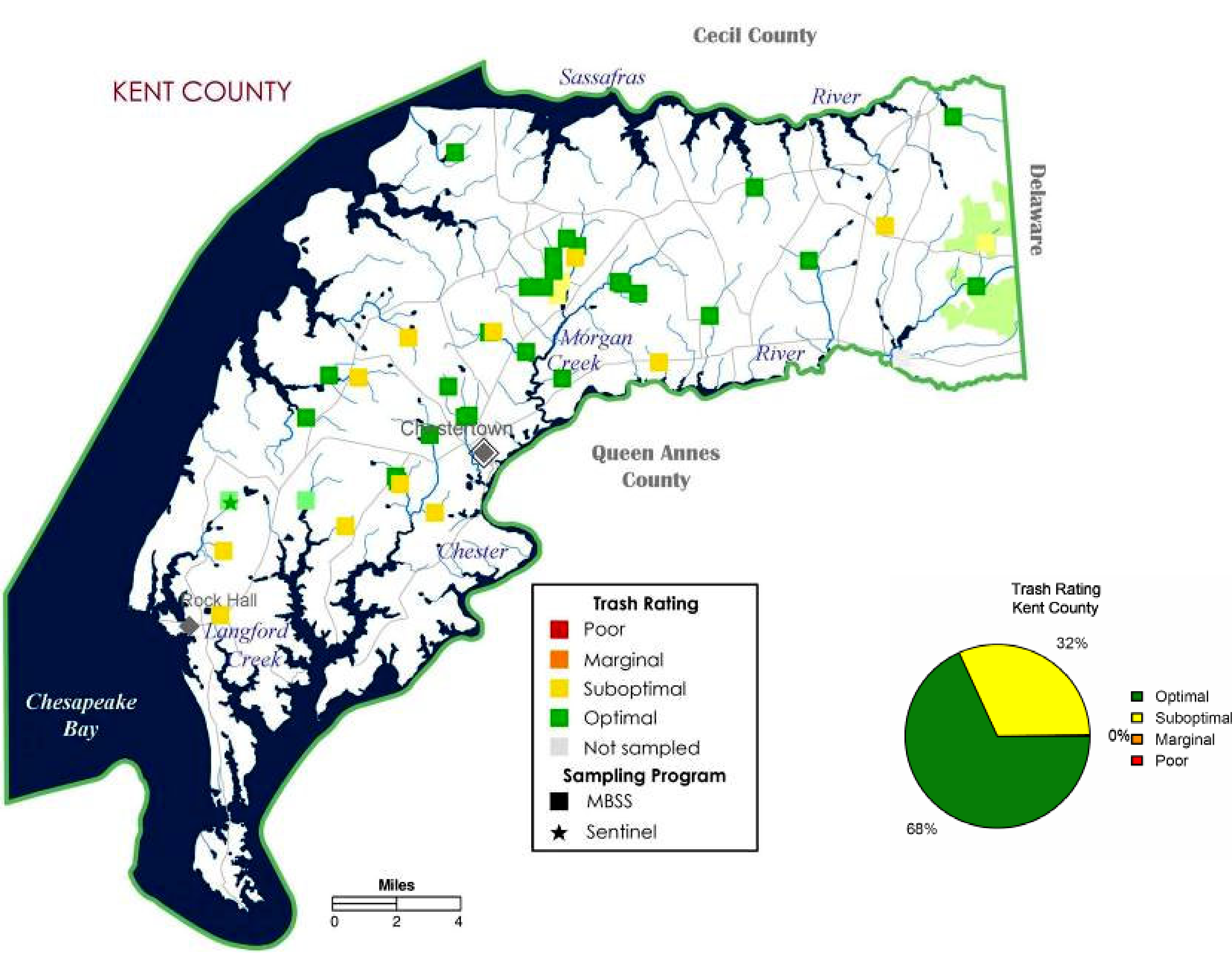


Figure 8-134. Pie chart and map of trash rating (0-20 scale) for Kent County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only)

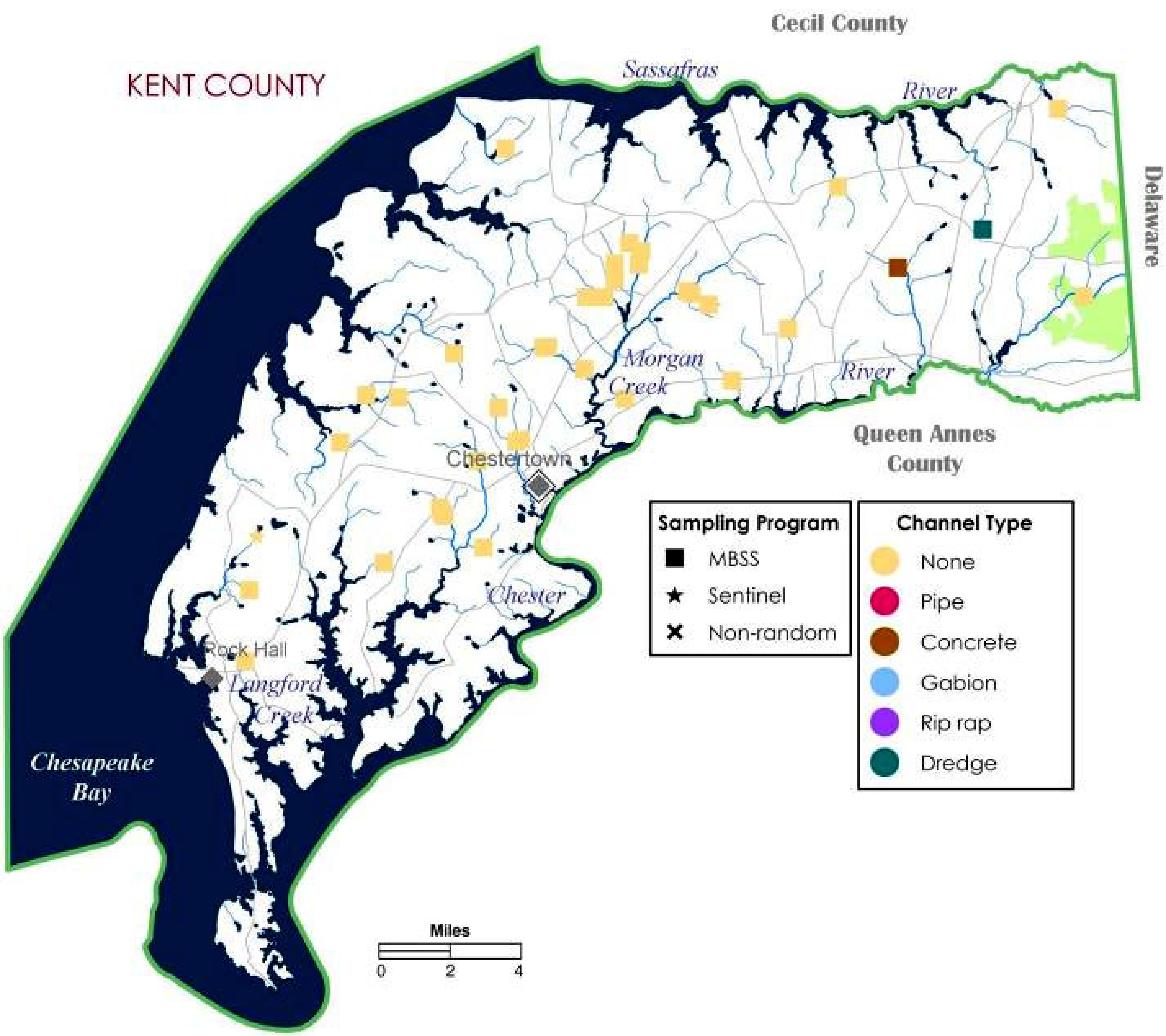


Figure 8-135. Map of channelized sites, by type, for Kent County streams sampled by the MBSS during 2000-2004. *NOTE: When channelization is indicated, it does not necessarily mean that the entire 75m segment was affected.*

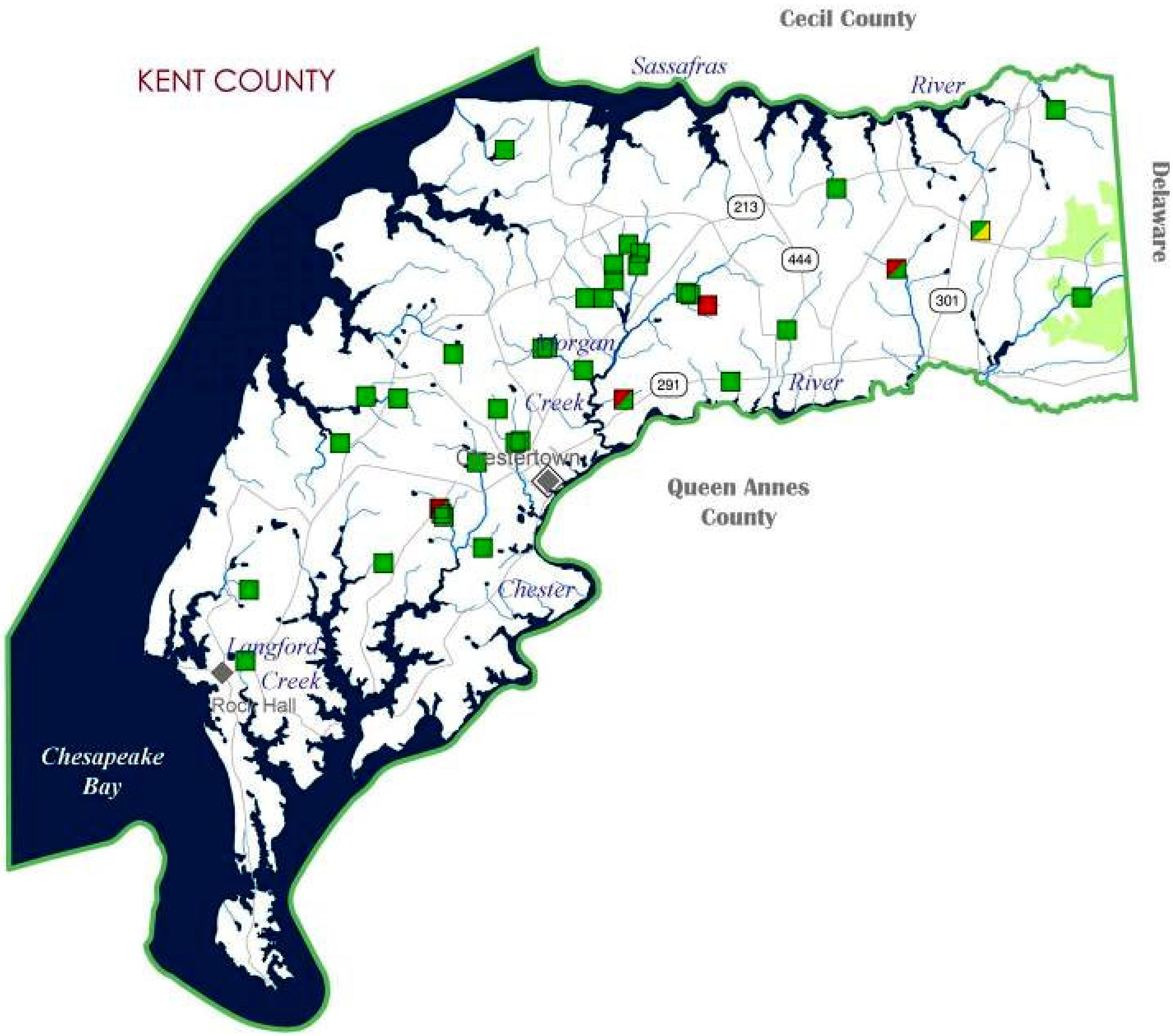


Figure 8-136. Map of sites with inadequate riparian buffers and buffer breaks for Kent County streams sampled by the MBSS during 2000-2004. *NOTE: Multiple riparian buffer breaks sometimes occurred at a site; only the most severe was depicted.*

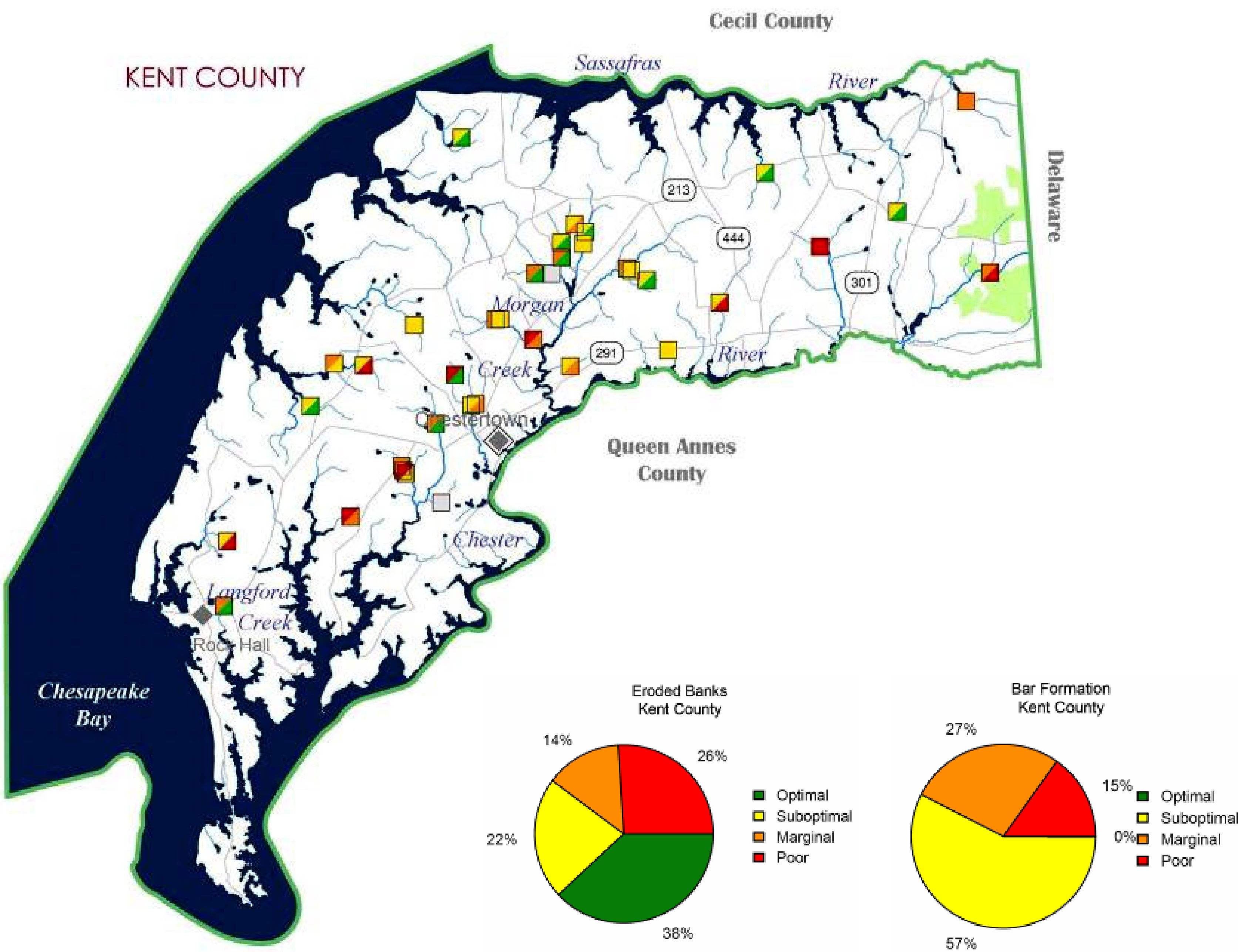


Figure 8-137. Pie charts and map of sites with eroded banks and instream bar formation for Kent County streams sampled by the MBSS during 2000-2004

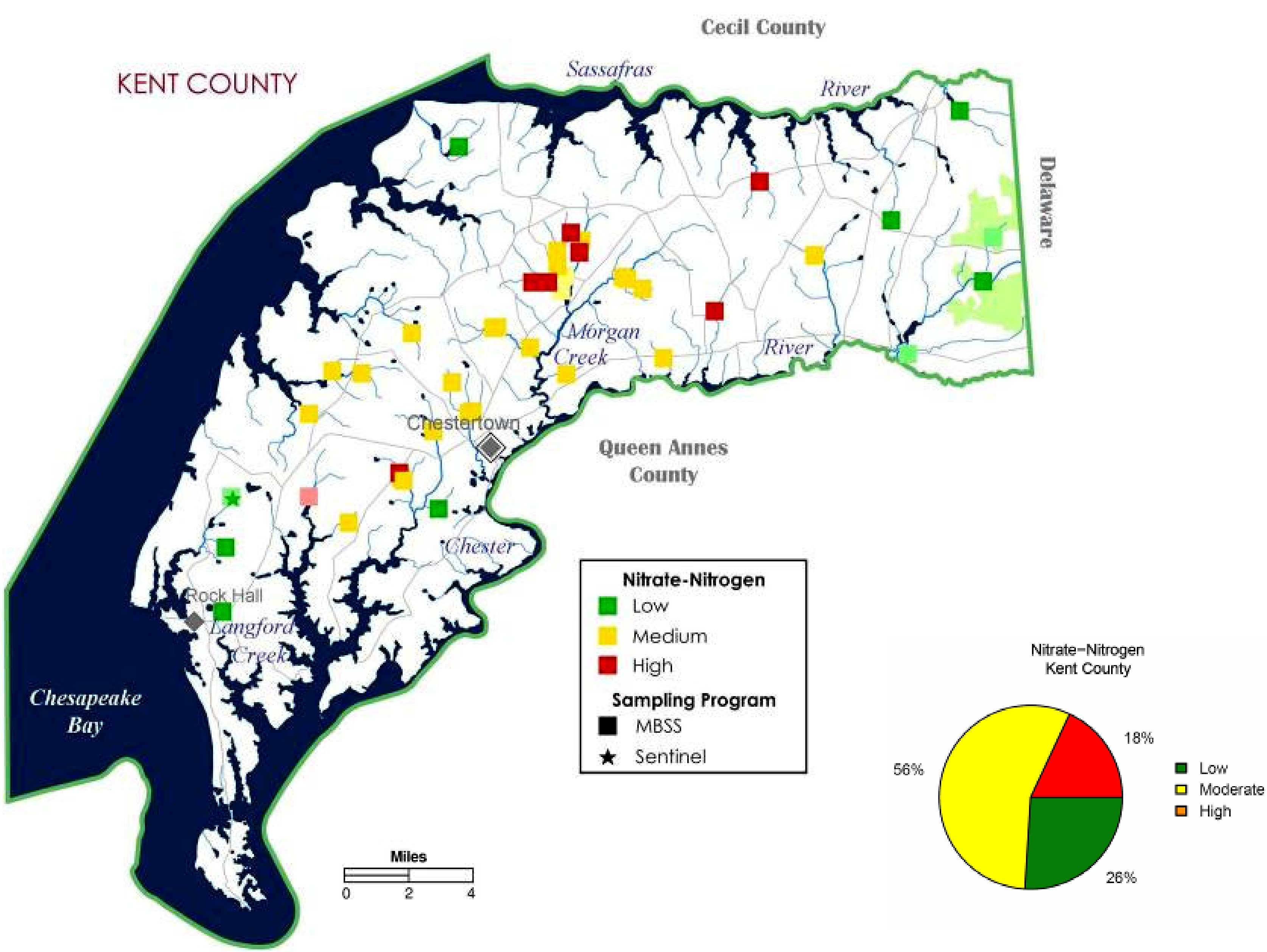
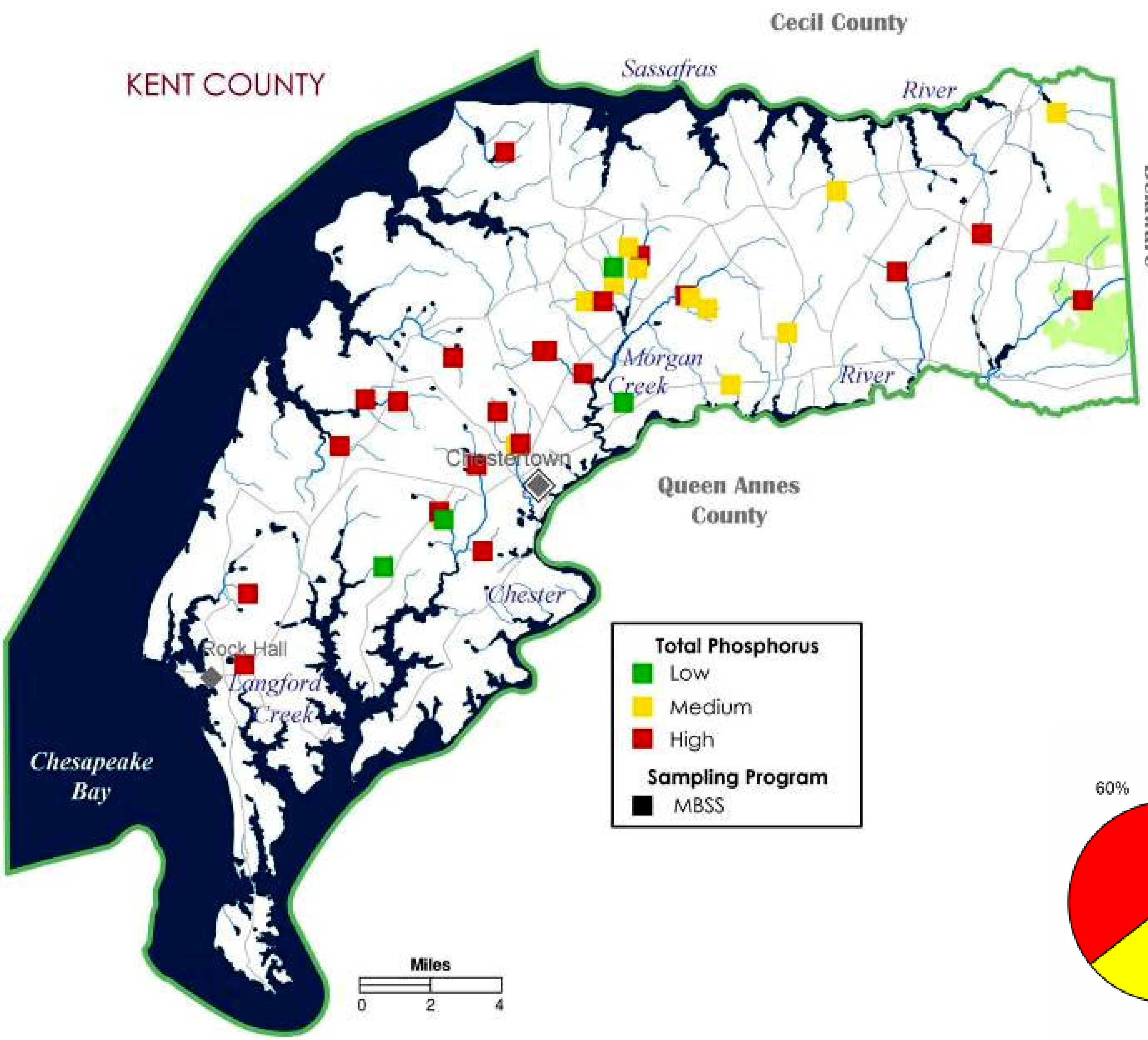


Figure 8-138. Pie chart and map of nitrate-nitrogen values (mg/l) for Kent County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only) (Low = 1.0, Medium = 1.0 – 5.0, High = > 5.0)



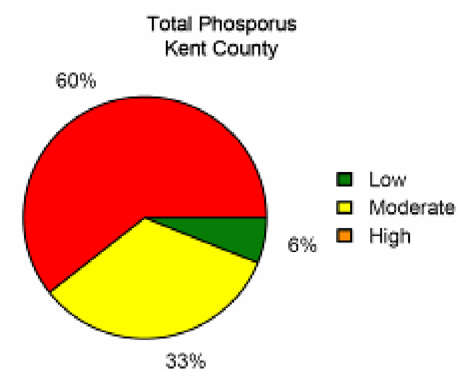


Figure 8-139. Pie chart and map of total phosphorus values (mg/l) for Kent County streams sampled by the MBSS during 2000-2004 (Low = < 0.025, Medium = 0.025 – 0.07, High = > 0.07)

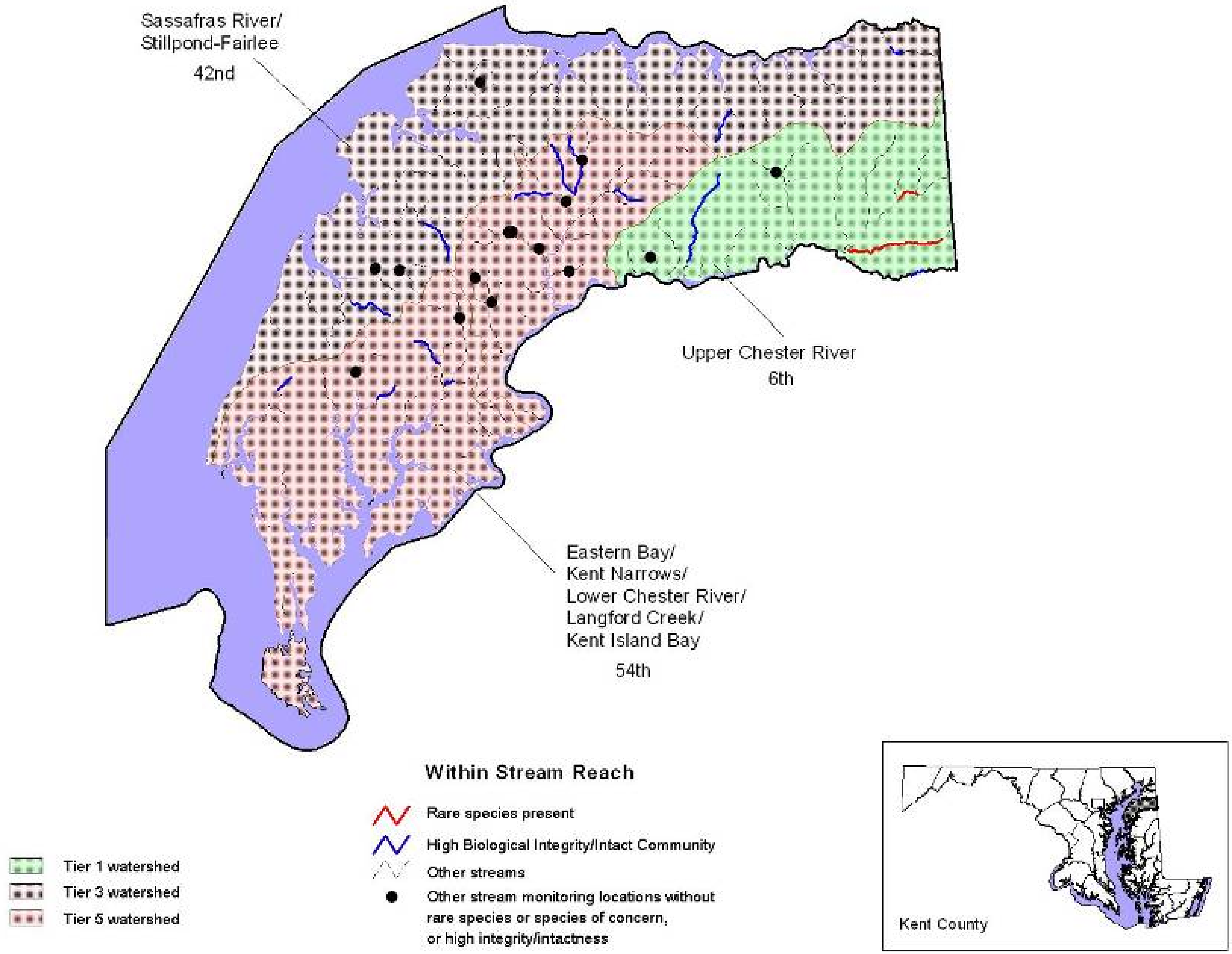


Figure 8-140. Aquatic Heritage Biodiversity Ranking map for Kent County, by watershed. Data from MBSS 1994-2004, MBSS qualitative data, Raesly, unpub. data, Harris 1975, Thompson 1984, and DNR Natural Heritage Program database.